rich in ammonia. The guano dust is carried by the prevailing west winds far into the country, and would fall into the mother-liquor lakes, where, on exposure to the air at a warm temperature, it would gradually oxidize to nitrate, and, acting on the sodium carbonate, would form sodium nitrate (Chili saltpetre).

The "caliche" (crude saltpetre) is most variable in appearance and in the percentage of nitrate which it contains. The various substances, other than sodium nitrate, which are found in the Tarapaca and Atacama deposits are described at length by the author, who compares them with those which are found at Stassfurt, and he traces in the comparative prominence of the more soluble salts in the Chilian deposits a further confirmation of his theory that the nitre-beds are formed from mother liquor salts.

The book is well indexed, and is supplied with a map and several sections of the district described.

J. I. W.

OUR BOOK SHELF.

Tenerife, and its Six Satellites. By Olivia M. Stone. In Two Vols. (London: Marcus Ward, 1887.)

A GOOD book on the Canary Islands, which have been of so much service to many an invalid, has long been wanted; for, as Mrs. Stone says, many parts even of the best-known islands of Tenerife and Gran Canaria are untrodden ground to English people, and are but little known to persons of any other nationality. Mrs. Stone supplies all the information that can be needed by the most exacting visitor to the islands, or by persons who may wish to read about them at home. As she has already shown in her "Norway in June," she has excellent powers of observation, and knows how to give a clear and effective account of all that she sees in her travels. In the present work her descriptions are all the more vivid because they were written "on the spot," when everything she wished to set down in her narrative was still fresh in her mind. To the Island of Hierro, to which she and her husband seem to have been the first English visitors, she devotes a good deal of attention; and what she has to say about that "solitary, happy, singular" island is full of interest, and would alone have justified her, if justification had been necessary, in making her travels in the Canary Islands the subject of a book. In an appendix she presents a useful epitome of all necessary expenses connected with her tour.

Through Central Asia. By Henry Lansdell, D.D. (London: Sampson Low, 1887.)

THIS is a popular edition of the author's well-known "Russian Central Asia, including Kuldja, Bokhara, Khiva, and Merv." He has omitted many whole chapters and most of the notes, thinking it best that the present edition should consist chiefly of a personal narrative. Any student who may desire fuller information regarding Central Asia is referred to the original work, in which Dr. Lansdell gives 4300 species of fauna and flora in about twenty lists with introductions, adds a bibliography of 700 titles, and treats more or less fully of the geography, economy and administration, ethnology, antiquities, history, meteorology, geology, zoology, and botany of all parts of Russian Turkistan, Kuldja, Bokhara, Khiva, and Turkmenia, down to the frontier of Afghanistan. To the new and abridged edition he has added an appendix on he delimitation of the Russo-Afghan frontier.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.

The Star of Bethlehem.

REFERRING to the hypothesis in your last week's issue, that the star of Bethlehem was Venus, I would point out that 1180 synodical periods of Venus (*i.e.* $1180 \times 583{\cdot}92 = 689{,}025$ mean solar days) take us back from October 28, 1887—when Venus was at her maximum brilliancy as a morning star—to only May 3 of the year 1 A.D. instead of December 25 of the year 1 B.C. For the number of days from October 28, 1887, to December 25, 1 B.C., is 689,155 (viz. $1887 \times 365{\cdot}2425 = 689{,}213 - 64 + 6 = 689{,}155$). This would appear to show, either that the birth of Christ took place about May 3, or that Venus at her maximum brilliancy as a morning star was not the star of Bethlehem. I should be glad of your remarks on this.

JOHN T. NICOLSON.

20 Thirlestane Road, Edinburgh, December 26, 1887.

I INFER from the article entitled "The Star of Bethlehem" (NATURE, December 22, 1887, p. 169) that the writer supposes the craze he deals with did not exist until Venus became a morning star. It was equally prevalent here when, early in the year, she was an evening star, as the following fact will show. On May 21, 1887, a lady wrote me as follows:—"Will you kindly tell me what people mean about '*a wonderful star*'? All our servants are talking about it. . . . Some call it '*the star of Bethlehem.*' . . . I hear it is '*wonderfully bright!*'"

Torquay, December 26, 1887. WM. PENGELLY.

IN regard to the so-called "star of Bethlehem," Prof. C. A. Grimmer, in "Life from the Dead," No. 69 (August 1879), p. 267, wrote:—"It will be seen in 'Cassiopeia's Chair,' and will be accompanied by a total eclipse of the sun and moon. The marvellous brilliancy of the 'star of Bethlehem' in 1887 will surpass any of its previous visitations. It will be seen even at noonday, shining with a quick flashing light the entire year, after which it will gradually decrease in brightness, and finally disappear."

E. COATHAM.

January 2.

On some Apparent Contradictions at the Foundations of Knowledge.

IN Chapter III. of Mr. Herbert Spencer's "First Principles" (p. 47, under heading, "Ultimate Scientific Ideas"), are treated the subjects of space and time. Here contradictions and difficulties of an apparently insuperable character are encountered in the attempt to define the nature of space and time, and the existence of these difficulties is frankly acknowledged. But with all the respect that is here due, it appears difficult to admit that these apparent contradictions are necessary, and in regard to space, in the first place, it will be my object here to suggest a remedy.

I will first quote some passages from the "First Principles" (5th edition) relating to this question, viz. as follows:—

"Thus as space and time cannot either be nonentities, nor the attributes of entities, we have no choice but to consider them as entities. But while on the hypothesis of their objectivity, space and time must be classed as things, we find on experiment that to represent them in thought as things is impossible" (p. 47).

It will be observed here that we encounter the apparent contradiction that those are classed as things which it is found impossible to represent in thought as things.[1]

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[1] Experiment would then indirectly say that space and time were *not* things.

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Then it is remarked, "To be conceived at all, a thing must be conceived as having attributes" (p. 47); and yet the author admits that it is impossible to assign any attribute to space (p. 48). So that it would appear from the last impossibility that space is *not* a thing (or entity).

It is added, "All entities, which we actually know as such, are limited" (p. 48). But, on the other hand, it is allowed that, "Of space and time we cannot assert either limitation or the absence of limitation" (p. 48).

It is observed also as follows:—"Nor are space and time unthinkable as entities, only from the absence of attributes" (p. 48). This would involve the conclusion apparently that that is considered to be an entity which is absolutely "*unthinkable*" as such.

Must there not be some flaw here, and some solution possible?

I have to propose—and this may appear very bold at first sight—that space is a non-entity. I must explain my meaning more fully. The first question or difficulty will be, How can we conceive of space (a void) or even talk of it, if it be a non-entity or nothing? In fact, on p. 177 is the remark, "Nothing cannot become an object of consciousness."

In reply to this, I would venture to suggest that under certain conditions, nothing can become an object of consciousness, viz. *by contrast with something*. We can be conscious of an absence. Darkness can become an object of consciousness by contrast with light. So space in itself—which I contend is nothing—is an object of consciousness [1] by contrast with matter.

We consider space to be an entity, I fancy, because of our experience with palpable air, &c., which (for convenience, but inaccurately) is called space. Space *per se*, an absolute void, we have no experience of. We measure all so-called spaces with matter—standards made of matter. We estimate how much solid matter is absent in a room (for instance), which we call its "volume." Mathematical lines are unconsciously figured as material no doubt from our habit of drawing them; and the spaces of triangles, &c., are usually filled out with solid matter.

It would be ridiculous (as it seems) to ask what would happen if a void disappeared. It cannot disappear because it is *already* nothing.

In regard to matter, we can conceive a certain volume of it, a certain volume added to that, &c.; and no doubt we cannot easily limit the conceivability thus extending to a larger volume. But we are not forced (by necessity as it were) to conceive an infinite volume of any entity or actually existing thing; and it appears that a void is excluded from the category of the unknowable, as we cannot expect to know anything about nothing.

Why do we hear of the creation of matter speculated about (as an inadequate attempt at explanation), but the creation of space regarded as absurd? [2] Because the first is an entity and the second is not. A non-entity cannot be supposed to be created, or it is absurd to ask the question.

One may encounter difficulties of explanation *by assuming too much to exist*—too much to explain, it appears. So I account for some of the startling contradictions supposed to exist at the basis of knowledge. What is nothing, if a void be not nothing? In order to be face to face with nothing and contrast it with something, we should not have to abolish a void, I venture to think.

Another matter seems important. On p. 34 ("First Principles") is the following, viz.:—"Did there exist nothing but an immeasurable void, explanation would be needed as much as now. There would still arise the question, How came it so? If the theory of creation by external agency be an adequate one, it would supply an answer; and its answer would be—Space was made in the same way that matter was made. But the impossibility of conceiving this is so manifest, that no one dares to assert it. For if space was created it must have been previously non-existent. The non-existence of space cannot, however, by any mental effort be imagined. . . . We are unable to conceive its absence either in the past or in the future."

In regard to the commencing passage, viz. "Did there exist nothing but an immeasurable void, explanation would be needed as much as now," it might be asked, When would you be satisfied with an explanation? Explanations must finish somewhere; they finish at existences, I should fancy, and cannot extend to their absence. It is this demanding explanation perpetually, without conceived limit, that leads to the contradictions and attempts at defining nothings—as seems manifest. Extraordinary as this view taken by the author appears, it is consistent with his assumption that an absolute void is an existence or thing, whereby it is put on the same footing as matter. But observe to what this further leads.

First, the inconceivable existence of an infinite thing without attributes is assumed. Second, its non-existence cannot "by any mental effort be imagined." This means, in my view, that all attempts to imagine it *more* nothing than it is, are futile. What better definition of nothing could we have than that we cannot assert it to have "either limitation or the absence of limitation," or it is "unthinkable" as an entity "from the absence of attributes"?

Well, in this way, actual existence of something which is put on the same footing as matter seems to be made a necessity for an infinite past time; as (unlike matter in this respect) we cannot even *imagine* change here—in fact, the original creation of this thing (a void) no one dares to assert." In the same way, no one would venture to assert the creation of a mathematical line, or a mathematical plane, *i.e.* the creation of extension [1] of one, two, or three dimensions.

From the author's conclusion that space is an entity, it may be reasoned, then, that, since we must apparently have one existence for an infinite past time, we may as well have two, or include matter. Hence, with all the deference which the views as a whole in the "First Principles" demand, I would point out that in this way support is given to the idea of existence for an infinite past time (impossible to grasp fairly, as the author concedes)—which, as I contend, is not warranted by the facts.

S. TOLVER PRESTON.

30 Rue de la Clef, Paris, December 1887.

Christmas Island.

HAVING read with much interest the description of Christmas Island by Captain Aldrich and Mr. Lister, I have endeavoured to interpret some of the facts there given in the light of my own examination of similar islands in the Western Pacific. As pointed out by Captain Wharton, the complete casing of an island, 1200 feet in height, with coral rock is somewhat unusual. This may find its explanation in in the absence of stream courses and ravines, a circumstance from which I infer that the island has not been exposed sufficiently long, since its upheaval, to the denuding agencies. When its surface has been extensively carved out by the action of running water, the old volcanic peak, which these upraised reefs envelop, will in all probability be exposed. Christmas Island, therefore, has still the early part of its story to unfold.

The three tiers of cliffs evidently mark pauses in the elevation. As they appear to decrease in height with the ascent, it would seem that older lines of cliffs on the upper slopes of the island have been removed to a great extent by denudation. The principal features of the movement of upheaval appear to resemble those of which similar upraised coral islands give evidence in the West Indies, Western Pacific, and other regions of elevated coral reefs. Protracted elevatory movements of from 100 to 300 feet are separated by long pauses, during which cliffs are worn back by the waves, and the reefs grow seaward: hence the terraced profiles of these islands. I have pointed out that in the Solomon Group these protracted movements consist of a succession of small upheavals of usually 5 or 6 feet at a time.

17 Woodlane, Falmouth. H. B. GUPPY.

A Mechanical Cause of the Lamination of Sandstone not hitherto noticed.

THE lamination of sedimentary rocks is usually attributed to the successive deposition of sediment of varying degrees of fineness or coarseness. Currents of water have a selective action

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[1] It appears that in order to assert an existence there must be a conception of non-existence as a contrast; otherwise the word "existence" would seem to have no distinct meaning. If matter be an existence, its absence (or a void) must be a non-existence. In other words, an absolute void (vacuity) is contemplated as the absence of existence.

[2] The author remarks of space, on p. 48, as follows:—"The only attribute which it is possible for a moment to think of as belonging to it, is that of extension; and to credit it with this implies a confusion of thought. For extension and space are convertible terms."

[1] The author remarks that "Extension and space are convertible terms" (p. 48). I may express my agreement with the author as to the inadequacy of the theory of the "creation" of matter, as an explanation.

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